AMENDMENTS TO THE SPECIFICATION

Replace the paragraph beginning on page 8, line 5, bridging page 9 lines 1-4 with the following amended paragraph:

A method of generating a check matrix for a low-density parity-check code in which at least one of weights of a column and a row are not uniform, using a ~~Caylay~~ Cayley graph, according to another aspect of the present invention includes determining a code length and a coding rate; determining the weights of the row and the column in the ~~Caylay~~ Cayley graph, which becomes a base, to create a basic matrix; selecting a maximum value of the weight of the column that satisfies a condition of "2<maximum value of the weight of the column≤number of 1s within columns in the ~~Caylay~~ Cayley graph"; searching provisionally an ensemble of the weights of the row and the column weights of the low-density parity-check code via optimization based on Gaussian approximation in a state that number of the weights of the row are limited to continuous two kinds to determine an optimum set of the weights of the row; deleting the rows sequentially from a bottom of the basic matrix considering number of rows after a division; searching provisionally an ensemble of the weights of the row and the column of the low-density parity-check code via optimization based on Gaussian approximation, using the set of the weights of the row as a fixed parameter, to determine an optimum set of the weights of the column; searching an optimal ensemble of the weights of the row and the column of the low-density parity-check code via optimization based on Gaussian approximation, using the set of the weights of the row and the column as a fixed parameter; and dividing at random the weights of the row and the column of the basic matrix after deleting the rows in a predetermined procedure based on a final ensemble.

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Please replace the paragraph beginning on page 11, line 5, bridging page 12 through lines 1-8 with the following amended paragraph:

An apparatus for generating a check matrix for a low-density parity-check code in which at least one of weights of a column and a row are not uniform, using a ~~Caylay~~ Cayley graph, according to still another aspect of the present invention includes a code-length/coding-rate determining unit that determines a code length and a coding rate; a ~~Caylay~~ Cayley-graph determining unit that determines the weights of the row and the column in the ~~Caylay~~ Cayley graph, which becomes a base, to create a basic matrix; a maximum-weight selecting unit that selects a maximum value of the weight of the column that satisfies a condition of "2<maximum value of the weight of the column≤number of 1s within columns in the ~~Caylay~~ Cayley graph"; a first weight searching unit that searches provisionally an ensemble of the weights of the row and the column weights of the low-density parity-check code via optimization based on Gaussian approximation in a state that number of the weights of the row are limited to continuous two kinds to determine an optimum set of the weights of the row; a deleting unit that deletes the rows sequentially from a bottom of the basic matrix considering number of rows after a division; a second searching unit that searches provisionally an ensemble of the weights of the row and the column of the low-density parity-check code via optimization based on Gaussian approximation, using the set of the weights of the row as a fixed parameter, to determine an optimum set of the weights of the column; a third searching unit that searches an optimal ensemble of the weights of the row and the column of the low-density parity-check code via optimization based on Gaussian approximation, using the set of the weights of the row and the column as a fixed parameter; and

a dividing unit that divides at random the weights of the row and the column of the basic matrix

after deleting the rows in a predetermined procedure based on a final ensemble.

Please replace the paragraph beginning on page 34, line 26, bridging page 35, lines 1-18

with the following amended paragraph:

According to still another aspect of the present invention, first a code length and a coding

rate are determined. Next, weights of rows and columns of a ~~Caylay~~ Cayley graph that become a

base are determined. A maximum value of a column weight is selected. In the state that row

weights are limited to continuous two kinds, an ensemble of Irregular-LDPC codes is searched

by Gaussian approximation. An optimum set of row weights is determined. Rows are deleted in

order from the bottom of the basic matrix by considering the number of rows after a division.

An ensemble of Irregular-LDPC codes is provisionally searched by Gaussian approximation

using a set of row weights. An optimum set of column weights is determined. An optimal

ensemble of Irregular-LDPC codes is searched by Gaussian approximation using the set of row

weights and the set of column weights as fixed parameters. Finally, weights of the rows and

columns of the basic matrix after deleting the rows are divided at random in a predetermined

procedure based on this ensemble. As a result, there is an effect that a definite and

characteristic-stabilized check matrix for "Irregular-LDPC Codes" corresponding to an optional

ensemble, an optional code length, and an optional coding rate can be easily generated in a short

time.

DRA/AMI/kpc

Please replace the paragraph beginning on page 37, lines 6-24 with the following amended paragraph:

According to still another aspect of the present invention, first a code length and a coding rate are determined. Next, weights of rows and columns of a ~~Caylay~~ Cayley graph that become a base are determined. A maximum value of a column weight is selected. In the state that row weights are limited to continuous two kinds, an ensemble of Irregular-LDPC codes is searched by Gaussian approximation. An optimum set of row weights is determined. Rows are deleted in order from the bottom of the basic matrix by considering the number of rows after a division. An ensemble of Irregular-LDPC codes is provisionally searched by Gaussian approximation using a set of row weights. An optimum set of column weights is determined. An optimal ensemble of Irregular-LDPC codes is searched by Gaussian approximation using the set of row weights and the set of column weights as fixed parameters. Finally, weights of the rows and columns of the basic matrix after deleting the rows are divided at random in a predetermined procedure based on this ensemble. As a result, there is an effect that a definite and characteristic-stabilized check matrix for "Irregular-LDPC Codes" corresponding to an optional ensemble, an optional code length, and an optional coding rate can be easily generated in a short time.

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